REMARKS/ARGUMENTS

Applicants and Applicant's attorney express appreciation to the Examiner for the courtesies extended during the recent interview held on March 16, 2004. Reconsideration and allowance for the above-identified application are now respectfully requested. Claims 1-23 are pending, wherein none of the claims have been amended. The Office Action indicates that claim 23 is presently allowed and that claims 5-8 would be allowable if rewritten in independent form to include the limitations of the base claim and any intervening claims. Accordingly, claim 7 is no longer withdrawn from consideration.

I. INTRODUCTION

The present invention is directed to propellants for gas generators that are suitable for use in deploying safety air bags in automobiles. The inventive compositions comprise (a) at least one fuel, (b) at least one oxidizing agent, and (c) at least one essentially chemically-inert slag trap that is at least one of Al_2O_3, TiO_2, or ZrO_2 particles formed so as to have a specific surface area of at least about 40 m^2/g. *See* Application, Claim 1.

The slag trap particles, when used in combination with the specific fuel(s) and oxidizing agent(s) recited in the claims, act as an internal filter and substantially prevents the formation of solid powder (dust-type) particles, as well as the expulsion of such toxic dust particles from the housing of the gas generator during burn-up. *See* Specification, page 1, first paragraph; page 9, last paragraph through page 11, second paragraph. The Al_2O_3, TiO_2, or ZrO_2 particles have a high fusion point so that they do not melt during the combustion and thus remain in their original condition so as to function as a slag trap from the beginning until the end of the combustion process. Due to the highly dispersed state of these compounds, they have a large surface (at least about 40 m^2/g) and, therefore, cause cooling of the liquid or molten burn-up products to a solid state.

The use of the claimed particles as slag traps results in a simplification of the filter in the housing of the gas generator because additional (*e.g.*, mechanical) fine filters in the housing of the gas generator are in part not necessary. This also leads to an advantageous saving of weight of the airbag gas generator. Furthermore, the formation of dust-type particles that can be expelled by the gas generator of an airbag, which can enter a person's lungs and pose a potential

health hazard, is minimized by the use of the slag trap components in the propellant compositions of the present invention.

The ability to trap the slag that is formed using the specific fuel(s) and oxidizer(s) recited in the claims using the specifically defined slag trap particles provides a solution to a problem that is not recognized, understood or discussed with any degree of clarity in any of the cited references. Since the problem of trapping slag is not recognized in the cited art, the art cannot be understood as providing a solution to this unstated problem. Neither providing low specific surface area fibers or whiskers (*Matsuda*) nor using a metal oxide catalyst to catalyzing CO and NOx gases to CO_2 and NO_2 (*Yoshida*) provide a solution to the problem of trapping the tiny slag particles that are created using the specific fuel(s) and oxidizer(s) recited in the claims. On the other hand, *Yamato* is entirely silent regarding either catalysis, scavenging or slag trapping.

Moreover, there is no teaching or suggestion in the art that would have motivated one of skill in the art to modify the teachings of either Matsuda et al. or Yamato et al. according to Yoshida et al. to obtain the composition claimed in the present application. The alleged motivations to combine these references in the manner urged in the Office Action is based on a mischaracterization of the applied art and assumptions as to the inherent properties or characteristics of the compositions disclosed in the applied art for which no evidence has been provided. To the extent they still apply to the current rejections, Applicants incorporate by reference the arguments set forth in Amendment "C" and Response filed November 6, 2003.

II. REJECTIONS UNDER 35 U.S.C. § 103

A. Combination of *Matsuda* and *Yoshida*

The Office Action rejects claims 1-4 and 9-22 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,149,745 to Matsuda et al. ("*Matsuda*") in view of U.S. Patent No. 5,827,996 to Yoshida et al. ("*Yoshida*") In making this rejection the PTO admits that "[t]he use of platinum as a catalyst, the surface area of the titanium oxide, and the particular amounts of the oxidizers are not disclosed" in *Matsuda*. For this reason the PTO seeks to combine *Matsuda* with *Yoshida* in order to provide the missing teachings. The three main issues to be discussed herein are whether the Office Action (1) articulates a valid motivation to combine the references, (2) shows where the combined teachings of the applied art teach or suggest every limitation recited in the claims, and (3) shows there would have been a reasonable

expectation of success based on the teachings in the applied art rather than Applicants' own disclosure.

1. The Alleged Motivation for Combining *Matsuda* and *Yoshida* is Based on a Mischaracterization of the Applied Art and Unsupported Assumptions Regarding the Characteristics of the Compositions Disclosed in *Matsuda* and *Yoshida*

The Office Action alleges the following motivation for combining *Matsuda* with *Yoshida*:

> It would have been obvious to use the titanium dioxide taught by Yoshida et al with the composition of Matsuda since Yoshida suggests that it will function to reduce the concentrations of CO and NOx and this is the purpose of the titanium oxide fiber disclosed in Matsuda.

Office Action, page 3.

There are at least three errors in the foregoing statement alleging motivation to combine *Matsuda* and *Yoshida*: (1) it is based on the false premise that reducing the concentration of CO and NOx is taught in both *Matsuda* and *Yoshida* and that this similarity in result forms a basis for combining the references; (2) it is based on the false premise that *Matsuda* teaches the use of titanium oxide fibers; and (3) it is based on an unspoken assumption, clarified during the Examiner Interview, that the catalysis function disclosed in *Yoshida* is inherently the same as the scavenging function disclosed in *Matsuda*. Because the statement alleging motivation to combine in the current Office Action is identical to the one in the non-final Office Action dated August 13, 2003, the PTO must withdraw the final rejection and either issue a non-final rejection presenting new grounds for rejecting some or all of the claims or a Notice of Allowance if Applicants establish any one of these three errors.

During the Examiner Interview, Applicants pointed out to the Examiner that, contrary to what is alleged in the Office Action, *Matsuda* does not teach the use of titanium dioxide fibers, nor does *Matsuda* teach that such fibers are used to reduce the concentrations of CO and NOx. The Examiner responded to the first point by acknowledging that she meant to say that *Matsuda* teaches the use of "zirconium oxide" rather than "titanium dioxide" and that the statement alleging the motivation to combine therefore contains a typographical error. Applicants submit

that this admitted error warrants a withdrawal of the finality of the rejection since any new Office Action correcting this error would be based on new grounds for rejection (*i.e.*, a new basis for combining the primary and secondary references). Whether or not the typographical error provides sufficient grounds for withdrawing the finality of the rejection, at the very least a new Office Action should be issued correcting the admitted error and providing a new shortened statutory period within which to respond.

As to the second point, the Examiner also admitted that *Matsuda* does not expressly teach that the ceramic fibers or whiskers reduce CO and NOx. Instead, the Examiner replied that the "scavenging effect" of the ceramic fibers and whiskers implied at col. 2, line 61 of *Matsuda* "is inherently the same thing" as catalyzing CO and NOx by the "burning catalyst" taught in *Yoshida* (col. 5, lines 25-50), and that for this reason it would have been obvious to substitute the "burning catalyst" particles of *Yoshida* for the "scavenging" ceramic fibers and whiskers of *Matsuda*. Applicants then pointed out that using a "burning catalyst" (such as titanium dioxide particles) to catalytically promote the transformation of CO and NOx to less dangerous gases (presumably CO_2 and NO_2) is quite different from "scavenging" using ceramic fibers or whiskers, at least to the extent that "scavenging" is alleged to logically relate to the slag trapping function of the "slag trap" recited in the claims of the present application. Applicants specifically pointed out to the Examiner that "scavenging" involves physically gathering or collecting something while "catalysis" of a gas involves no physical collection of the gas but only a chemical transformation of the gaseous compound into another compound.

Matsuda does not in fact disclose what is "scavenged" by the ceramic fibers or whiskers. Thus, we must look to the ordinary meaning of this term to determine what *Matsuda* may have meant. According to Random House Webster's College Dictionary (1995), "scavenge" means "1. to take or gather (something usable) from discarded material". This is entirely consistent with how Applicants interpreted this term during the Examiner Interview: physically gathering or collecting something tangible (*e.g.*, a liquid or solid). In the context of the combustion of air bag propellants "scavenging" arguably relates to collecting solid and/or liquid components contained in the burning propellant. If that is what the ceramic whiskers and fibers of *Matsuda* do their function is arguably similar to that of the claimed "slag trap" in the present application. However, this function is fundamentally different than that of the "burning catalyst" of *Yoshida*,

which is not alleged to perform any scavenging function whatsoever, let alone the "scavenging" or "trapping" of slag. Col. 5, lines 25-50.

The Random House Webster's College Dictionary (1995) defines the term "catalyst" as follows: "1. a substance that causes or speeds a chemical reaction without itself being consumed". This is entirely consistent with the meaning of the term "burning catalyst" as used in *Yoshida* when describing titanium oxide, zirconium oxide, and other metal oxide particles having a specific surface area that is preferably at least 40 m^2/g. Col. 5, lines 25-50. This also confirms Applicants position that *Yoshida* is entirely devoid of any teaching or suggestion that the "burn catalyst" disclosed therein performs the same function as the scavenging ceramic fiber or whisker of *Matsuda*. For this additional reason the Office Action provides no valid basis for combining *Matsuda* and *Yoshida*.

In the Office Action the Examiner goes to great lengths in asserting that, in her opinion, the burning catalyst of *Yoshida* inherently traps slag. However, when asked during the Examiner Interview where this alleged slag trapping function is taught in the art, the Examiner could not identify any such teaching. Instead, she simply asserted that "that's what they [titanium particles] do". However, simply alleging that a substance provides an inherent function without supporting evidence is improper. According to MPEP § 2112,

> **EXAMINER MUST PROVIDE RATIONALE OR EVIDENCE TENDING TO SHOW INHERENCY**
>
> The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.' " *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted) (The claims were drawn to a disposable diaper having three fastening elements. The reference disclosed two fastening elements that could perform the same function as the three fastening elements in the claims. The court construed the claims to require three separate elements and held that the reference did not disclose a separate third fastening element, either expressly or inherently.).

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original) (Applicant's invention was directed to a biaxially oriented, flexible dilation catheter balloon (a tube which expands upon inflation) used, for example, in clearing the blood vessels of heart patients). The examiner applied a U.S. patent to Schjeldahl which disclosed injection molding a tubular preform and then injecting air into the preform to expand it against a mold (blow molding). The reference did not directly state that the end product balloon was biaxially oriented. It did disclose that the balloon was "formed from a thin flexible inelastic, high tensile strength, biaxially oriented synthetic plastic material." *Id.* at 1462 (emphasis in original). The examiner argued that Schjeldahl's balloon was inherently biaxially oriented. The Board reversed on the basis that the examiner did not provide objective evidence or cogent technical reasoning to support the conclusion of inherency.).

In the present case, the Examiner relies on the unsupported assertion that the "burning catalyst" of *Yoshida* can inherently function as a "slag trap" within the meaning of this term as defined and claimed in the present application. When pressed by Applicants how she knew this, she simply asserted that "that's what they do". According to MPEP § 2112 the Examiner has utterly failed to meet the burden of showing that the "burning catalyst" of *Yoshida* inherently behaves as a slag trap. For this additional reason the Office Action fails to state a *prima facie* obviousness rejection relative to *Matsuda* and *Yoshida* because the Examiner has not provided any evidence to establish any logical nexus between the "burning catalyst" of *Yoshida* and the fibers or whiskers of *Matsuda* that would have motivated the skilled artisan to modify the composition of *Matsuda* by substituting the ceramic fibers or whiskers with the "burning catalyst" of *Yoshida*.

As argued previously in Amendment "C" and Response, the skilled artisan would not have been motivated to substitute the burning catalyst particles of *Yoshida* for the ceramic fibers or whiskers because to do so would apparently diminish the "scavenging effect" according to *Matsuda*. In response to this argument the Office Action alleges that *Matsuda* does not absolutely forbid the use of particles, such as the burning catalyst particles of *Yoshida*. This argument entirely misses the point. That something is possible or not forbidden does not render it obvious (*i.e.*, not explicitly forbidding the use of particles instead of whiskers or fibers does not make the substitution obvious).

Even assuming for the sake of argument that *Matsuda* suggests the use of ceramic particles, there is certainly no teaching or suggestion that would have motivated one of skill in the art to select the specific "slag trap" particles recited in the claims of the present application. For one thing, none of the applied references understands the selection of slag trap particles having a minimum specific surface area of 40 m^2/g to be a result-effective variable with respect to trapping slag. Whereas *Yoshida* discloses particles having such a specific surface area, the disclosed purpose of such particles is to act as a "burning catalyst" not to trap slag. Therefore, there is no teaching or suggestion in the art that would have motivated the specific selection of the burning catalyst particles of *Yoshida* over, say, ceramic particles, fibers or whiskers that are chemically and physically similar to whiskers or fibers disclosed in *Matsuda* but that have an aspect ratio outside the specified range (*i.e.*, 3 to 2000). Col. 2, line 59. Of course, because *Matsuda* teaches that particles are "notably reduced in a scavenging effect", Applicants maintain that *Matsuda* leads away from substituting the "burning catalyst particles" of *Yoshida* for fibers or whiskers having an aspect ratio of 3 to 2000. Col. 2, lines 60-61. *See W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984) (A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention).

2. The Office Action Fails to Show where the Combined Teachings of of *Matsuda* and *Yoshida* Teach or Suggest Every Limitation in the Claims

Claim 1 recites the inclusion of slag trap "particles formed by a gas phase reaction". Claim 22 further requires such particles to be "highly dispersed". The advantage of such particles so formed in trapping slag is clearly explained in the description of the invention. Application, page 9, last paragraph through page 11, second paragraph. Among other things, "[t]he highly resolved lattices, i.e., the large inner surface of for example Al_2O_3, TiO_2 or ZrO_2 (in highly dispersed form) cause . . . take-up of, in particular, liquid and/or solid slag portions and particles, respectively, which are developed during burn-up." As discussed in previous amendments, the ceramic whiskers or fibers of *Matsuda* are neither "formed by a gas phase reaction" nor are they "highly dispersed" (*i.e.*, have "a large inner surface" as a result of having "highly resolved lattices"). Nor is there is any teaching or suggestion in *Yoshida* that the

"burning catalysts" disclosed therein possess the same beneficial properties that characterize the "slag trap particles" that are specifically disclosed and claimed in the present application. During the Examiner Interview, when asked why she never addressed this claim element by showing where it is found in the applied art, the Examiner responded that "process limitations are given no patentable weight". This entirely misses the point.

The recitation in claims 1 and 22 that the slag trap particles are "formed by a gas phase reaction" is not a process limitation but a description that helps to define important and essential properties of the slag trap particles. By way of analogy, frozen water formed in a snow cloud yields water in a form (*i.e.*, a snow flake) that is quite different in form than frozen water that is formed by placing water in an ice-making tray. Clearly the snow flake has a different physical structure than an ice cube and will behave quite differently under a variety of circumstances even though both consist of the same chemical compound--water. Likewise, the slag trap particles "formed by a gas phase reaction" are not the same as "burning catalyst particles" formed some other way, even if they are both made from the same chemical compound (*e.g.*, titanium dioxide). In any event, the term "highly dispersed" in claim 22 is certainly not a process limitation.

In view of the foregoing, Applicants submit that the claims are patentable over the combination of *Matsuda* and *Yoshida* because the combined teachings of these referenes, even if properly combinable, do not teach or suggest every limitation found in the claims. Nor does the Office Action even allege that *Matsuda* and *Yoshida* inherently teach the limitations found in claims 1 and 22 discussed herein. For this additional reason, the Office Action fails to state a *prima facie* obviousness rejection over *Matsuda* and *Yoshida.*

3. The Office Action Fails to Show Where the Combined Teachings of of *Matsuda* and *Yoshida* Provide a Reasonable Expectation of Success

The purpose of the slag trap particles recited in claims 1 and 22 is to trap slap slag that is generated during burn-up of the propellant composition recited therein in order to facilitate the removal of slag by filtration. For the sake of argument, the ceramic fibers and whiskers disclosed in *Matsuda* may arguably inherently provide a "scavenging effect" of slag, although *Matsuda* does not explicitly state that slag is, in fact, what is scavenged by the ceramic fibers and whiskers disclosed therein. On the other hand, there is no teaching or suggestion in the art that

the "burning catalyst" of *Yoshida*, if included within the *Matsuda* composition in place of the ceramic fibers or whiskers, would provide a similar scavenging effect. Instead, *Yoshida* teaches that the "burning catalyst" is included to "reduce the concentrations of CO and NOx". Col. 5, lines 25-27. The only basis for even alleging that one of skill in the art would have been motivated to substitute the "burning catalyst" of *Yoshida* with the ceramic fibers or whiskers of *Matsuda* is the unsupported allegation that the "burning catalyst" of *Yoshida* inherently acts a scavenger. However, since *Matsuda* is silent as to what is being scavenged by the ceramic fibers or whiskers, it is impossible to know whether or not the "burning catalyst" would, in fact, act in the same manner. For this reason alone, the inherency argument is specious.

Moreover, the allegation that the "burning catalyst" of *Yoshida* would successfully trap slag appears to be based entirely on hindsight, which is not a legitimate basis for rejecting claims. As far as Applicants can tell, the only teaching in the record for the proposition that titanium dioxide particles having a specific surface area of at least about 40 m^2/g are good at trapping slag is found in the present application. However, any reasonable expectation of success of an alleged modification or combination of references must be found in the prior art, not an applicant's own disclosure. So far, the Examiner has failed to provide any teaching in the prior art that would show that the "burning catalyst" particles of *Yoshida* would act to trap slag. When confronted with this very important omission, the Examiner's only response during the Examiner Interview was to say "that's what they do", which is not a sufficient basis for establishing inherency, which requires a showing that a particular result is "necessarily present". "Inherency, however, may not be established by probabilities or possibilities." MPEP § 2112.

In short, the Office Action fails to state a *prima facie* obviousness rejection for this additional reason.

B. **Combination of *Yamato* and *Yoshida***

The Office Action rejects claims 1-4 and 9-22 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,190,474 to Yamato et al. ("*Yamato*") in view of U.S. Patent No. 5,827,996 to Yoshida et al. ("*Yoshida*") In making this rejection the PTO admits that "[t]he use of platinum as a catalyst, the use of titanium oxide, and the particular amounts of the oxidizers are not disclosed" in *Yamato*. For this reason the PTO seeks to combine *Yamato* with *Yoshida* in order to provide the missing teachings.

Yamato is even more deficient than *Matsuda* with respect to the claimed slag trap particles because, unlike *Matsuda*, *Yamato* does not disclose any component that scavenges anything, let alone slag. Indeed, the statement alleging motivation to combine *Yamato* and *Yoshida* at page 4 of the Office Action does not even allege that the "burning catalyst" of *Yoshida* provides the same or similar function as any component disclosed in *Yamato*. For this reason, the combination of *Yamato* and *Yoshida* is even less warranted than the combination of *Matsuda* and *Yoshida*. Accordingly, Applicants incorporate by reference the arguments set forth above with respect to the combination of *Matsuda* and *Yoshida* in response to the combination of *Yamato* and *Yoshida* and also add that *Yamato*, being more deficient than *Matsuda* relative to any teaching for the trapping or scavenging of slag, provides an even weaker basis for rejecting that claims when combined with *Yoshida*.

The statement in the Office Action alleging motivation to combine *Yamato* and *Yoshida* is illogical as it provides no logical nexus or connection between the CO- and NOx-reducing effect of the "burning catalyst" of *Yoshida* and any motivation to include it in the *Yamato* composition to trap slag:

> It would have been obvious to use the titanium dioxide taught by Yoshida et al with the composition of Yamato since Yoshida suggests that it will function to reduce the concentrations of CO and NOx. Since combustion of the similar composition of Yamato will result in slag formation it would be a benefit to use the titanium oxide teaching to reduce the formation of harmful CO and NOx.

Office Action, page 4.

The foregoing statement is illogical because it rests on the faulty premise-conclusion that one would have been motivated to add the "burning catalyst" of *Yoshida* to trap slag because the "burning catalyst" reduces formation of CO and NOx. However, CO and NOx are not slag but gases. Since neither *Yamato* nor *Yoshida* contain any teaching or suggestion that the "burning catalysts" of *Yoshida* do anything other than catalyze the further oxidation of CO and NOx to CO_2 and NO_2, neither reference provides any suggestion to use the "burning catalyst" of *Yoshida* to trap slag within the *Yamato* composition.

Moreover, as stated above, the Examiner has provided no evidence that the burning catalyst of *Yoshida* would, in fact, act to trap slag within the composition of either *Matsuda* or *Yamato*. This important premise rests upon nothing more than conjecture and assumption, which

is forbidden according to MPEP § 2112, quoted extensively above. Thus, there is neither motivation to combine, nor is there any reasonable expectation of success, found anywhere in the cited art. They can only be found in Applicants' own disclosure, which is improper to rely on when making an obviousness rejection.

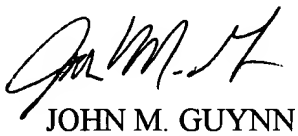
Finally, the Office Action fails to show where the combination of *Yamato* and *Yoshida* teaches or suggests the limitations in claims 1 and 22 relative to the specific characteristics of the slag trap particles recited therein. More specifically, the Office Action fails to show where *Yamato* and/or *Yoshida* teach or suggest slag trap "particles formed by a gas phase reaction" and/or that are "highly dispersed" as recited in claims 1 and 22, respecitively. For this additional reason the Office Action fails to state a prima facie obviousness rejection of claims 1 and 22 over *Yamato* and *Yoshida*.

III. CONCLUSION

In view of the foregoing, Applicants submit that the claims are allowable over the prior art of record. In the event that the Examiner finds remaining impediment to a prompt allowance of this application that may be clarified through a telephone interview, or that can be overcome by an Examiner's Amendment, the Examiner is requested to contact the undersigned attorney.

Dated this 16th day of March 2004.

Respectfully submitted,



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